State-Level Defense Purchases:

An Introduction to RDEPPS

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1. INTRODUCTION

Projections of direct defense expenditures and defense-related expenditures in each of the 50 states and the District of Columbia are made using the Regional Defense Employment and Purchases Projection System (*RDEPPS*). *RDEPPS* is a component of the Defense Employment and Purchases Projection System (*DEPPS*), a forecasting system developed by the U.S. Department of Defense (DoD) to project defense purchases and employment.[1]

The objective of *RDEPPS* is to forecast defense expenditures at the state level, in constant prices, over the interval defined by DoD's Future Years Defense Program (FYDP). *RDEPPS* projections, which are updated annually, are made available on request to businesses, trade associations, state and local government planning agencies, and other organizations with an interest in defense markets in particular geographic regions.

The estimates are intended to serve as benchmarks. They describe the future pattern of defense and defense-related expenditures assuming that each state's share of the various components of defense activity remains what it has been in recent years. Actual spending will, of course, be determined by competition for defense contracts, and so may differ from historical distributions. The projections cannot forecast such changes. They do, however, account in detail for the effects of changes in the composition of defense spending on the geographic distribution of expenditures.

This booklet was developed as a reference tool for *RDEPPS* users. It begins by explaining—using sample projections—what the *RDEPPS* estimates cover and how they should be interpreted. Subsequent sections describe how the projections are generated and discuss sources of uncertainty in them.

Relationship of State-Level Projections to National Projections

RDEPPS' treatment of defense expenditures differs from that of *IDEPPS* in several important ways. The complementary purposes that these systems serve explain the differences between them. *IDEPPS* is designed to investigate economy-wide effects of the defense budget by simultaneously determining domestic production, imports, and indirect purchases by industry. *RDEPPS*, on the other hand, is designed to investigate the distribution, across states, of annual defense expenditures, including military retirement disbursements. Therefore, *RDEPPS* includes only that part of active-duty and retirement pay spent domestically, making an explicit adjustment for pay that is received abroad. Retirement pay is treated on a disbursement basis in *RDEPPS*, as opposed to an accrual basis in *IDEPPS*. The *RDEPPS* measure of pay (and, therefore, of total direct defense expenditures) is reduced by excluding pay received abroad, but is increased by the fact that retirement disbursements currently exceed accruals. The net effect is that *RDEPPS* projections of total direct spending are somewhat larger than the comparable *IDEPPS* projections.

[1] DEPPS comprises three main components: the Industry Defense Employment and Purchases Projection System (*IDEPPS*); *RDEPPS*; and an employment (i.e., skilled labor) projection system called *LDEPPS*.

2. SAMPLE STATE-LEVEL PROJECTIONS

RDEPPS projections are based on historical shares of defense prime contracts awarded to various industrial sectors, and on the geographic distribution of DoD's military and civilian employees and retirees. In general, the projections:

- Are in constant (that is, inflation-adjusted) dollars, by calendar year;[2]
- Are based on the President's budget request and so reflect planned expenditures, not actual appropriations or budget authority;
- Reflect DoD expenditures for military programs only. They do not include expenditures for civil programs administered by the Defense Department (such as public works projects of the Army Corps of Engineers) or defense-related expenditures by other federal agencies;
- Reflect planned DoD outlays (i.e., the total amount of funds expended in a given year, as distinct from appropriations, which are typically voted in a single year but are paid out over several years); and
- Apply only to expenditures made in the United States. The projections exclude the cost of imported products and of items bought abroad.

These characteristics must be kept in mind when comparing the state-level estimates with *IDEPPS* projections, budget data, and published industry statistics.

RDEPPS projections are made for defense purchases and pay in the 50 states and the District of Columbia. Projections are also made of the geographic distribution of defense purchases from each of 97 industrial sectors.

The expenditure projections are presented in two formats, one designed to show the level and composition of potential expenditures in individual states and the other to illustrate the geographic distribution of purchases from given industrial sectors.

Expenditure Tables. Table 1 illustrates the format of the state-by-state expenditure projections, using the forecast for New Mexico as an example. The first section of the table provides aggregate measures (i.e., dollar values) of projected direct and indirect defense expenditures in the state during each of the forecast years. For purposes of comparison, a projection of nondefense economic activity and total output, prepared by Interindustry Forecasting at the University of Maryland (INFORUM), also is provided. The second and third sections of the table identify the industrial sectors projected to lead in defense or defense-related sales over the forecast period.

[2] For example, the projections generated in the spring of 2000 for the following year are presented in constant 2001 dollars.

The "Total Direct Expenditures" row at the top of the table shows the monies projected to be disbursed by the Defense Department to purchase goods and services and to cover payroll expenses. Purchases of magnetic recording tape by the Defense Logistics Agency and the wages of military and civilian personnel at Kirtland Air Force Base are two examples of such expenditures. Direct purchases, in turn, trigger subsequent rounds of transactions, referred to collectively as "indirect defense purchases resulting from direct purchases." These expenditures represent purchases by DoD's prime contractors (and their suppliers) of parts and materials used in producing items ordered by DoD. Fuel bought by a trucking company for transporting a shipment of goods to a DoD facility, or forgings purchased by an aircraft manufacturer for incorporation into a jet fighter, are examples of this type of expenditure. "Indirect defense purchases resulting from pay" ($592 million in 2001) represent purchases by DoD's military and civilian employees of goods and services for their personal use. The purchase of a clock radio by a DoD employee would be an example of this category of expenditure. The personal consumption expenditures of military and civilian employees may be taken as a measure of the indirect effects of the pay portion of the DoD budget. These are included in *RDEPPS* (but not in other parts of *DEPPS*) because they are often a focus of attention in local development efforts.

Table 1. New Mexico Summary
(In millions of 2001 dollars)

	2000	2001	2002	2003	2004	2005	2000-05
AGGREGATE MEASURES							
Total Direct Expenditures (Purchases and Pay)	2,431	2,394	2,368	2,365	2,375	2,391	-0.33
Indirect Defense Purchases Resulting from Direct Purchases	1,013	975	996	1,013	1,034	1,062	0.95
Indirect Defense Purchases Resulting from Pay	603	592	585	584	586	592	-0.37
Total Nondefense Expenditures	87,090	89,819	91,204	93,416	95,977	98,626	2.49
Total Output	91,138	93,780	95,154	97,378	99,971	102,672	2.38
Government Industry Compensation	1,390	1,372	1,351	1,343	1,344	1,352	-0.55
LARGEST PURCHASES BY INDUSTRIAL SECTORS							
Total Direct Expenditures (Purchases and Pay)							
Research labs and other professional services	458	458	450	445	438	430	-1.28
New construction	115	117	113	113	113	114	-0.22
Air transport	95	94	95	102	112	117	4.13
Trucking, highway passenger transit	57	58	60	61	63	65	2.79
Gas utilities	38	35	34	34	34	34	-1.92
Indirect Defense Purchases Resulting from Direct Purchases							
Research labs and other professional services	148	147	148	150	151	153	0.62
Gas utilities	105	102	99	99	96	95	-2.09
Other business services	104	104	106	109	112	114	1.96
Real estate and royalties	74	72	71	72	76	79	1.14
Crude petroleum	74	55	61	59	61	67	-2.04

In 2001, some $2,394 million in direct expenditures is projected to be disbursed by the Defense Department in New Mexico to pay its employees and reimburse its direct suppliers for goods and services they provide. As the "Government Industry Compensation" line shows, over half of this amount ($1,372 million) will consist of pay to military personnel and civilian government workers. The remaining $1,022 million ($2,394 million minus $1,372 million) represents direct

purchases by DoD. Together, DoD's direct expenditures for purchases and pay in 2001 ($2,394 million) are projected to generate indirect purchases of $975 million by DoD suppliers and $592 million by military and civilian DoD employees.

The second and third sections of the table show that purchases from research labs and other professional services will account for the largest share of direct and indirect defense purchases ($458 million and $147 million, respectively) in 2001.

Tables 2 and 3 illustrate the format of the industry projections, using estimated purchases from the Communications Equipment sector as an example. (This sector is designated industry 366 under the Standard Industrial Classification (SIC) system.) Two tables are provided for each of 97 industrial sectors, the first showing the 10 states in which the bulk of direct defense sales are projected to be made over the forecast period and the second showing the 10 states in which indirect defense sales are projected to be concentrated. Altogether, the 10 states listed in Table 2 are estimated to account for 84 percent of total direct purchases of communications equipment in 2001. The 10 states listed in Table 3 are expected to receive 69 percent of total indirect spending.

Table 2. Top 10 States in Direct Purchases of Communications Equipment, 2000-2005 (In millions of 2001 dollars)

	2000	2001	2002	2003	2004	2005	2000-05
Florida	1,141	1,156	1,154	1,154	1,155	1,138	-0.05
California	878	901	913	938	963	963	1.85
Massachusetts	706	728	743	767	792	792	2.30
Washington	517	540	565	593	621	624	3.77
Indiana	518	534	544	562	581	583	2.34
Maryland	395	404	407	418	429	429	1.67
Texas	381	392	399	413	426	427	2.28
New York	317	325	328	336	345	344	1.64
Virginia	274	277	274	276	278	275	0.12
Iowa	197	205	212	221	230	231	3.14
Top 10 Total	5,324	5,460	5,540	5,677	5,817	5,806	1.73
Total U.S.	**6,315**	**6,471**	**6,553**	**6,709**	**6,868**	**6,854**	**1.64**

Table 3. Top 10 States in Indirect Purchases of Communication Equipment, 2000-2005 (In millions of 2001 dollars)

	2000	2001	2002	2003	2004	2005	2000-05
California	112	117	122	126	128	130	2.84
Florida	73	76	81	84	85	87	3.51
Texas	71	72	74	76	77	78	1.90
Massachusetts	59	61	63	65	65	65	1.93
Illinois	56	57	58	60	60	61	1.65
New Jersey	32	34	35	37	37	38	3.34
Nevada	26	28	29	30	30	30	2.78
Virginia	26	27	29	30	30	30	3.11
Ohio	26	27	27	28	28	28	1.10
New Mexico	26	26	27	27	27	28	1.57
Top 10 Total	507	524	544	563	567	574	2.47
Total U.S.	**733**	**756**	**783**	**809**	**815**	**826**	**2.37**

3. HOW THE ESTIMATES ARE DEVELOPED

This section describes how the state-level estimates of direct and indirect defense expenditures are developed. The computations themselves are elementary. Their form is as follows:

State *I's* share of defense expenditures in category *J*	X	National total defense expenditures in category *J*

Estimates of total defense expenditures (or of some component of total expenditures) in a state are produced by summing the estimates across the appropriate expenditure categories. Understanding how the estimates are computed is a matter of knowing which categories of expenditures are considered and how the state shares are established.[3]

***Categories of Defense Expenditures Used in Making the Estimates*.** The state-by-state estimates are calculated using a "top-down" approach. The point of departure is the annual defense budget, submitted to Congress each February, and the corresponding Future Years Defense Program (FYDP). The budget and FYDP data are the main inputs to *IDEPPS*. *IDEPPS* takes this information and converts it into projected purchases from some 320 industries across the country. The *IDEPPS* projections are then aggregated to 97 industries for which *RDEPPS* estimates of expenditures at the state level are prepared.

The state-level estimates cover expenditures originating from six aggregate accounts of the defense budget: military personnel; procurement; research, development, test, and evaluation (RDT&E); operations and maintenance (O&M); military construction; and military retirement pay. These accounts cover the military functions of the Department of Defense. Civil functions, such as public works projects of the Army Corps of Engineers, are not included.

[3] A more complete explanation of the methods used to generate the state-level estimates can be obtained from the INFORUM website at http://inforumweb.umd.edu/.

Three categories of information from *IDEPPS* are used:

- Pay projections, both for active-duty and retired military personnel and for DoD's civilian work force;
- Projected direct defense purchases from each of 320 *IDEPPS* industries; and
- Projected indirect defense purchases from each *IDEPPS* industry.[4]

The following sections discuss each of these categories in turn.

DoD Pay. Historically, the distribution of DoD pay among states has differed significantly from the distribution of direct purchases. Consequently, in estimating future levels of defense expenditures, it is useful to treat pay and purchases separately. This requires some transformation of the budget data because pay expenditures are not grouped into a single account. With the exception of the retirement pay account, which consists entirely of pay, several budget accounts cover both purchases and pay.[5]

For each budget account, *DEPPS* separates nonpay and pay components. The pay portions cover the wages and salaries of military and civilian DoD personnel, whether they are stationed in the United States or abroad. Because the state-level estimates consider only expenditures made in the United States, aggregate pay data are adjusted to remove that fraction of pay disbursed outside the country.

This adjustment is quite substantial. In 2001, about 15.8 percent of the active-duty force will be stationed overseas, in U.S. territories, or aboard ships in foreign waters. An estimate of these individuals' pay must be subtracted from total military pay in order to arrive at an estimate of the pay going to military personnel stationed in the United States. (Though service members stationed outside the country do not necessarily receive all of their pay abroad, there is no simple way to determine what proportion is received by dependents living in the United States, or how those funds are distributed among the individual states.) Moreover, some civilian personnel are stationed overseas or in U.S. territories, and some military retirees live abroad. Small adjustments to civilian pay and to military retirement pay are therefore made as well.[6]

Direct Defense Purchases. DEPPS separates the purchases components of the budget accounts into estimates of direct defense purchases from each of 320 *IDEPPS* industries. The purchase estimates are computed using what is referred to as the "*DEPPS* translator." The translator is constructed from detailed studies of the purchases funded by various accounts of the DoD budget and, especially, the pattern of purchases involved in the acquisition of major weapon systems. In

[4] See the companion publication, *U.S. Defense Purchases: An Introduction to IDEPPS,* for a detailed explanation of how the national-level estimates are produced.

[5] Although the military personnel account consists primarily of pay, it also covers some purchases. Likewise, although most of DoD's civilian work force is paid through the O&M account, other accounts (such as RDT&E, military construction, and family housing) also include pay for civilian employees.

[6] These shares are derived from the table "DoD Estimated Payroll, Contracts, and Grants by State/Area," available on the Web at http://web1.whs.osd.mil/mmid/l03/fy98/98estp.htm. Some data from this table are summarized in Table 5 in this booklet.

broad terms, the translator describes—account by account—the shares of outlays that go to purchase the outputs of various *IDEPPS* industries.[7]

As is the case with pay, some adjustments of the initial figures are required in order to arrive at estimates of purchases in the United States. First, an estimate of the value of goods purchased abroad for use abroad (called "noncomparable imports") is subtracted from total purchases. (These purchases consist largely of petroleum.) Next, an estimate of goods purchased abroad for consumption in the United States is deducted. In making this calculation, it is assumed that imports constitute the same share of defense purchases of the products of various industries as they do of nondefense purchases from those industries. Estimated purchases from each industry are adjusted in this way in order to arrive at an estimate of domestic purchases. After these adjustments have been made, the estimated direct purchases from the 320 *IDEPPS* industries are aggregated into purchases from 97 industrial sectors. This ensures that the estimates will conform to those for indirect defense expenditures, which, because of data limitations, are made at the 97-sector level.

The direct purchase estimates are computed separately for each of five aggregate accounts of the DoD budget: procurement; O&M; RDT&E; military construction and family housing; and military personnel. The result is projections, for each aggregate account, of domestic direct defense purchases from each of the 97 industrial sectors. Table 4 illustrates the outcome, using projected purchases from the O&M account as an example. After the purchases have been allocated by sector, they are distributed at the state level on the basis of state shares of direct purchases arising from each budget account. Note that the state shares differ for each of the major five accounts. Furthermore, pay is distributed using pay shares, as described below. This procedure has the very important advantage of reflecting the effects of changes in the composition of defense purchases, but it requires very detailed information, drawn from a number of sources, on historical state shares of direct defense expenditures.

Indirect Defense Expenditures. Indirect purchases are triggered by purchases made directly by DoD. Each indirect purchase, in turn, typically generates a series of subsequent purchases. The following discussion describes how these sequences of transactions are reflected in the estimates of indirect defense purchases and notes an important limitation of the estimates.

To begin with a simple example, an indirect defense purchase is generated when a radio manufacturer buys electronic components for the radios it sells to DoD. In this case, the indirect purchase (of electronic components) is made by a prime contractor to DoD. This is not, however, always the case. Indirect purchases can—and in important instances do—arise through a series of transactions. Examples of indirect purchases involving several steps are:

- Purchases of forgings by firms that produce landing gear for military aircraft; and

- Purchases of transportation services for shipment of test equipment to a firm that produces optical instruments incorporated in fire control systems.

[7] A more detailed discussion of the translator can be found in *U.S. Defense Purchases: An Introduction to IDEPPS*. Further documentation is available upon request.

Table 4. Estimated Domestic O&M Purchases by the Top 50 Industrial Sectors, 2000-2005 (In millions of 2001 dollars)

	2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2000-05*
Agriculture, forestry, and fisheries	126	131	128	129	132	131	0.78
Crude petroleum	228	154	181	177	185	210	-1.60
New construction	4,766	4,881	4,761	4,828	4,875	4,859	0.39
Meat products	300	193	233	226	237	273	-1.90
Other food products	1,918	1,233	1,488	1,443	1,517	1,745	-1.90
Apparel	188	141	157	154	159	174	-1.49
Printing and publishing	256	218	225	225	229	239	-1.33
Other chemicals	336	333	328	332	338	341	0.25
Petroleum refining	2,642	1,731	2,068	2,009	2,107	2,410	-1.84
Fuel oil	2,288	1,498	1,790	1,739	1,824	2,087	-1.84
Metal products	2,350	2,269	2,241	2,249	2,251	2,260	-0.78
Agriculture, construction, mining, and oil field equipment	233	208	215	215	221	231	-0.15
Metalworking machinery	405	354	337	305	280	270	-8.15
Special industry machinery	140	123	127	125	127	132	-1.28
General and miscellaneous industrial machinery	302	253	269	267	274	291	-0.80
Computers	1,994	1,912	1,905	1,918	1,948	1,980	-0.15
Electrical industrial apparatus	131	123	124	124	125	128	-0.45
Electric lighting and wiring equipment	457	419	429	430	434	447	-0.43
Communication equipment	1,890	1,905	1,856	1,877	1,899	1,900	0.11
Electronic components	903	898	886	891	891	890	-0.30
Motor vehicles	317	303	296	300	301	301	-1.02
Motor vehicle parts	172	128	142	140	145	159	-1.62
Aerospace	3,773	3,826	3,739	3,757	3,815	3,831	0.31
Ships and boats	1,212	1,254	1,232	1,248	1,243	1,231	0.31
Other transportation equipment	180	171	168	170	170	171	-1.09
Search and navigation equipment	1,002	1,032	1,007	1,021	1,030	1,025	0.47
Medical instruments and supplies	202	164	175	174	178	190	-1.20
Other instruments	505	476	478	481	487	497	-0.29
Miscellaneous manufacturing	128	115	117	117	119	123	-0.92
Trucking, highway passenger transit	1,621	1,330	1,401	1,395	1,428	1,518	-1.31
Water transport	1,359	1,379	1,351	1,366	1,364	1,356	-0.04
Air transport	2,528	2,523	2,478	2,500	2,550	2,577	0.38
Communications services	3,245	2,539	2,777	2,751	2,844	3,081	-1.04
Electric utilities	1,728	1,620	1,638	1,653	1,695	1,744	0.19
Gas utilities	359	324	332	334	343	355	-0.20
Water and sanitary services	580	567	561	567	577	585	0.16
Wholesale trade	3,355	2,429	2,761	2,708	2,815	3,126	-1.41
Restaurants and bars	554	558	544	550	556	557	0.09
Finance and insurance	442	387	402	402	414	435	-0.35
Real estate and royalties	541	523	508	504	506	510	-1.15
Hotels	563	545	538	541	547	553	-0.35
Personal and repair services, except auto	185	187	182	185	187	186	0.08
Professional services	9,968	10,170	9,930	10,065	10,134	10,094	0.25
Computer and data processing	4,500	4,246	4,272	4,295	4,367	4,467	-0.15
Other business services	1,626	1,524	1,538	1,546	1,576	1,617	-0.11
Automobile services	208	202	199	201	203	205	-0.31
Physicians	496	435	446	446	451	467	-1.20
Other medical services and dentists	1,790	1,799	1,755	1,777	1,796	1,795	0.05
Education, social services, membership organizations	573	581	562	566	569	567	-0.21
Federal, state, and local government enterprises	156	129	138	138	143	152	-0.52
Government industry	41,887	40,735	39,200	38,602	38,372	38,382	-1.75
Total	**109,100**	**102,426**	**101,938**	**101,475**	**102,324**	**104,280**	**-0.90**

In the first of these cases, there are two indirect defense purchases: (1) of landing gear by the aircraft prime contractor; and (2) of forgings by the producer of the landing gear. There is a sequence of three indirect defense purchases in the second case: (1) of optical instruments by the producer of the fire control systems (the prime contractor); (2) of test equipment by the supplier of optical instruments; and (3) of transportation services by the supplier of the test equipment.

Although indirect defense purchases constitute a sizable share of total defense spending, only fragmentary data on their geographical distribution are available. Moreover, as the examples above suggest, assembling a reasonably complete data series would be a very large undertaking. Such purchases can readily be estimated, however, using an input/output (I/O) table.

DEPPS uses the I/O table maintained by INFORUM.[8] The INFORUM table has one column for each of 320 commodity groups (industries). Each column shows the shares of the total cost of producing the commodity in question accounted for by purchases of various other commodities. For example, the optical instruments column shows purchases of test equipment and other commodities required to produce optical instruments.

The computations proceed along the lines of the examples given above. The point of departure is a vector of the dollar value of direct defense purchases from each of the 320 industries in the I/O table. This vector of expenditures was obtained in the previous step by applying the defense translator to the major accounts of the DoD budget. Next, the input-output table is used to compute the dollar volume of the inputs that must be purchased from each industry in order to produce this bill of final purchases. For example, if engines account for 15 percent of the cost of military aircraft, each $100 million in DoD aircraft purchases generates an estimated indirect purchase of $15 million worth of engines.

The computation does not stop at this point. The I/O table is also used to compute "inputs to the inputs" (for example, forgings used in jet engines), "inputs to the inputs to the inputs" (the titanium used in producing the forgings incorporated in jet engines), and so on through successive rounds of production. At each successive round, import demands generated for that round are removed. Purchases from a given sector, in each successive round, are then summed to yield an estimate of indirect defense purchases from that sector.[9]

The results are estimates of the indirect defense purchases that arise from the nonpay portion of the DoD budget. The pay portion of the budget also has indirect effects, which are frequently a focus of attention in economic development efforts, especially at the local level. Consequently, in making the state-level estimates, indirect defense purchases are defined as the sum of: (1) indirect purchases stemming from the purchases component of the DoD budget; and (2) consumption expenditures (indirect purchases resulting from the pay of military and civilian personnel) of defense employees. The latter expenditures are included as an admittedly crude measure of the economic activity that stems from the pay portion of the DoD budget.

[8] The INFORUM I/O table is an updated version of the 1992 Benchmark table prepared by the Bureau of Economic Analysis in the Department of Commerce.

[9] The process is truncated after a comparatively small number of rounds because the total value of requirements becomes quite small. This happens because, at any given round, only a fraction of total cost represents purchases from other sectors.

It has sometimes been questioned whether indirect purchases—computed in the manner described above—involve double counting. The simple answer is "no." The value of each pound of, say, aluminum that goes into defense production (however indirectly) is counted only once. It is true, however, that the summation of indirect defense purchases from different sectors typically will involve double counting.

Returning to an earlier example, consider a firm that sells $50 million worth of landing gear to a DoD prime contractor and buys $15 million worth of forgings (to produce the landing gear) from another firm. The sum of the two indirect defense purchases is $65 million. But this figure involves double counting in that the $50 million received by the seller of the landing gear reflects the $15 million cost of the forgings.

The fact that the summation of indirect purchases involves double counting in this sense is not a unique characteristic of these estimates. It is a characteristic of all commonly-used data on the total value of outputs or shipments of various industries. Double counting can be avoided only if industry outputs are stated in terms of value added (that is, the total value of outputs less the cost of purchased inputs).

Value added by industry sums to gross domestic product (GDP) at the national level and to gross state product at the state level. The sum of outputs over all industries will invariably amount to a number more than twice as large as GDP, due to the double counting alluded to above. Since *RDEPPS* estimates focus on total output or total requirements, they cannot be meaningfully compared to GDP or gross state product.

Once indirect purchases have been estimated for each of the 320 industries, the computations proceed in much the same way as those for direct defense purchases. The adjusted estimates are aggregated to the 97-sector level. There is no basis, however, for estimating how state shares of indirect purchases (from a given industrial sector) vary depending on the budget account from which the purchases originate. Consequently, in making the state-level estimates, indirect purchases are not computed separately for each of the budget accounts. Instead, indirect defense purchases from each of the 97 sectors, reflecting the entire nonpay component of the DoD budget, are used to estimate purchases at the state level.

***Estimation of State Shares*.** State shares of DoD pay and direct purchases are calculated using historical data showing the distribution of those expenditures across states in recent years. Since adequate historical data on the distribution of indirect defense purchases are not available, a somewhat different method is used to calculate state shares of those purchases. This section describes how state shares are established for each category of expenditures, and notes the potential limitations of the respective methods.

State Shares of Pay. Estimated outlays for military pay are allocated among the states on the basis of each state's share of total military pay in the most recent year for which pay-allocation data are available. Table 5 shows the distribution across states of civilian, military (active and reserve), and military retirement pay in FY 1998. The percentages to the right of the pay figures in each column show the individual states' shares of nationwide pay disbursements in each category. The shares are held constant over the projection period. Military retirement pay and

civilian pay likewise are distributed among the states on the basis of the distribution during the base period.

Table 5. Projected Distribution of DoD Payroll by State, Fiscal Year 1998 (In thousands of dollars)

	Civilian Pay	%	Total Military Pay	%	Active-Duty Military Pay	%	Reserve and National Guard Pay	%	Military Retirement Pay	%
Alabama	1,001,233	3.5	664,392	1.7	494,292	1.5	170,100	3.9	784,621	2.6
Alaska	190,294	0.7	550,430	1.4	526,700	1.6	23,730	0.5	109,286	0.4
Arizona	340,211	1.2	658,367	1.7	612,354	1.8	46,013	1.0	843,698	2.8
Arkansas	135,900	0.5	213,743	0.6	147,320	0.4	66,423	1.5	371,812	1.2
California	3,380,238	11.8	4,529,473	11.8	4,221,857	12.5	307,616	7.0	3,569,166	11.8
Colorado	437,391	1.5	1,026,027	2.7	925,632	2.7	100,395	2.3	837,537	2.8
Connecticut	109,227	0.4	260,172	0.7	227,322	0.7	32,850	0.7	163,863	0.5
Delaware	44,317	0.2	135,939	0.4	103,341	0.3	32,598	0.7	101,995	0.3
District of Columbia	649,006	2.3	423,849	1.1	387,813	1.1	36,036	0.8	58,548	0.2
Florida	1,181,656	4.1	2,295,563	6.0	2,132,688	6.3	162,875	3.7	3,238,515	10.7
Georgia	1,235,732	4.3	2,149,935	5.6	2,004,651	5.9	145,284	3.3	1,179,540	3.9
Hawaii	774,176	2.7	1,462,493	3.8	1,414,250	4.2	48,243	1.1	247,915	0.8
Idaho	47,663	0.2	146,135	0.4	119,374	0.4	26,761	0.6	164,114	0.5
Illinois	619,713	2.2	963,382	2.5	838,015	2.5	125,367	2.8	476,254	1.6
Indiana	282,163	1.0	204,843	0.5	35,989	0.1	168,854	3.8	287,966	0.9
Iowa	49,030	0.2	73,071	0.2	13,827	0.0	59,244	1.3	127,093	0.4
Kansas	208,427	0.7	564,418	1.5	503,493	1.5	60,925	1.4	302,492	1.0
Kentucky	260,220	0.9	1,122,639	2.9	1,061,970	3.1	60,669	1.4	335,023	1.1
Louisiana	290,856	1.0	486,399	1.3	376,869	1.1	109,530	2.5	420,825	1.4
Maine	243,518	0.8	128,756	0.3	100,033	0.3	28,723	0.7	164,602	0.5
Maryland	1,643,353	5.7	1,061,560	2.8	952,830	2.8	108,730	2.5	761,357	2.5
Massachusetts	333,319	1.2	191,416	0.5	101,773	0.3	89,643	2.0	290,907	1.0
Michigan	374,999	1.3	117,504	0.3	38,083	0.1	79,421	1.8	319,046	1.1
Minnesota	97,344	0.3	116,648	0.3	21,527	0.1	95,121	2.2	193,894	0.6
Mississippi	383,014	1.3	471,386	1.2	380,312	1.1	91,074	2.1	359,488	1.2
Missouri	361,246	1.3	562,220	1.5	400,640	1.2	161,580	3.7	476,531	1.6
Montana	41,888	0.1	115,644	0.3	90,152	0.3	25,492	0.6	105,166	0.3
Nebraska	137,863	0.5	304,310	0.8	270,601	0.8	33,709	0.8	207,308	0.7
Nevada	78,367	0.3	243,487	0.6	226,411	0.7	17,076	0.4	415,381	1.4
New Hampshire	43,344	0.2	42,717	0.1	22,715	0.1	20,002	0.5	159,392	0.5
New Jersey	796,270	2.8	337,184	0.9	247,972	0.7	89,212	2.0	317,060	1.0
New Mexico	325,249	1.1	386,275	1.0	357,265	1.1	29,010	0.7	362,729	1.2
New York	474,104	1.6	791,825	2.1	620,203	1.8	171,622	3.9	437,515	1.4
North Carolina	625,655	2.2	2,327,302	6.1	2,219,231	6.6	108,071	2.4	1,125,369	3.7
North Dakota	58,703	0.2	236,650	0.6	210,865	0.6	25,785	0.6	49,174	0.2
Ohio	1,122,397	3.9	425,335	1.1	291,155	0.9	134,180	3.0	582,947	1.9
Oklahoma	795,085	2.8	900,332	2.4	817,176	2.4	83,156	1.9	494,135	1.6
Oregon	119,923	0.4	81,556	0.2	20,147	0.1	61,409	1.4	321,209	1.1
Pennsylvania	1,202,830	4.2	294,938	0.8	113,115	0.3	181,823	4.1	647,958	2.1
Rhode Island	222,982	0.8	151,003	0.4	125,206	0.4	25,797	0.6	95,046	0.3
South Carolina	373,661	1.3	1,085,263	2.8	984,551	2.9	100,712	2.3	808,103	2.7
South Dakota	42,552	0.1	101,629	0.3	77,539	0.2	24,090	0.5	79,099	0.3
Tennessee	206,054	0.7	182,787	0.5	78,655	0.2	104,132	2.4	660,739	2.2
Texas	1,778,344	6.2	3,501,713	9.1	3,232,627	9.5	269,086	6.1	3,062,996	10.1
Utah	510,654	1.8	214,765	0.6	136,427	0.4	78,338	1.8	189,128	0.6
Vermont	19,125	0.1	25,810	0.1	3,743	0.0	22,067	0.5	46,506	0.2
Virginia	3,896,509	13.6	4,102,055	10.7	3,991,864	11.8	110,191	2.5	2,442,831	8.1
Washington	1,032,257	3.6	1,587,944	4.1	1,475,410	4.4	112,534	2.5	1,146,647	3.8
West Virginia	62,711	0.2	58,246	0.2	15,322	0.0	42,924	1.0	127,829	0.4
Wisconsin	68,747	0.2	103,267	0.3	13,123	0.0	90,144	2.0	207,427	0.7
Wyoming	34,396	0.1	109,458	0.3	93,219	0.3	16,239	0.4	64,027	0.2
Total U.S.	**28,743,916**		**38,292,255**		**33,877,649**		**4,414,606**		**30,341,809**	

Because the state distributions are fixed at historical levels, increases in military or civilian pay (or in military retirement annuities) over the projection period affect only the estimated amount of pay going to each state, not each state's share relative to other states. That is, if the amount of military pay disbursed in state *x* in the base period were twice that disbursed in state *y*, the estimates for each future year would show twice as much military pay being disbursed in state *x* as in state *y*.

This "fixed shares" assumption can lead to serious distortions in the estimates if there are major changes in the number of personnel within given states (or in the distribution of personnel among pay grades) over the projection period.

State Shares of Direct Defense Purchases. DoD does not maintain records of *outlays* for purchases on a geographic basis. The Defense Acquisition Data Management System (also known as the Prime Contract Award Database), however, does record prime contract *awards* by location, and most DoD purchases are made on the basis of such contracts.[10] These data can be used to estimate historical state shares of direct defense purchases—arising from the different budget accounts—from each of the 97 industrial sectors.

To do this, it is first necessary to group prime contract awards according to the budget accounts that fund them. A second step is required because the data cover contract awards, rather than outlays. Contracts typically generate outlays over a period of years. Consequently, a state's share of contract awards in any given year is not as good a measure of its share of outlays in that year as is its average of awards over a period of years. For this reason, the state shares used in producing the *RDEPPS* estimates are established on the basis of contracts awarded over a three-year period.

The Prime Contract Award Database does not provide the full range of data needed to do a total mapping of each budget account. For example, information on state shares of purchases from the nonpay portion of the military personnel account are not maintained in the database. These purchases (broken out by industry) are distributed among the states in proportion to their shares of the labor force of the industry in question. That is, if *x* percent of the employees in a given industrial sector work in state *y*, it is assumed that *x* percent of the purchases from that industry arising from the nonpay portion of the military personnel account are made in state *y*. Table 6 summarizes the data used to compute the state-share estimates for each of the accounts.

The state shares for each combination of budget account and industry are held constant throughout the forecast period; therefore, the estimates do not reflect changes in the geographic pattern of contract awards for any given industry. Because disaggregated state shares are used, the estimates reflect changes in the relative size of the budget accounts and in the mix of purchases funded by each account.

[10] The prime contract award data cover contracts worth $25,000 and above.

Table 6. Sources of Historical State Shares of Direct Defense Purchases

Aggregate Budget Accounts	*Sources of Data*
Procurement Research, Development, Test, and Evaluation Operations and Maintenance	State shares (for each industrial sector) computed using the Prime Contract Award Database
Military Construction	State shares (for each industrial sector) computed using the Prime Contract Award Database for product categories and the crosswalk between those categories and SIC codes
Military Personnel	Derived from state shares of national employment for each industrial sector (assumed to be equal to state shares of purchases from each sector)

State Shares of Indirect Defense Purchases. Indirect defense expenditures are distributed among the states in two ways. For most manufacturing industries, the market is considered to be national in scope, and defense expenditures are distributed on the basis of states' shares of total production in each of the 97 industrial sectors. Thus, a state accounting for 5 percent of national production in the electronic equipment industry would be allocated 5 percent of estimated indirect defense expenditures on electronic equipment.

Certain service and other sectors are assumed to serve primarily local markets. For these sectors (e.g., utilities, retail trade, finance, insurance, and real estate), the assumption that defense-related production would follow national employment patterns seems less reasonable. Real estate and rental transactions, for example, are more likely to follow the distribution of the defense activities that use these services than they are to mirror national real estate and rental patterns. The share of indirect defense purchases from these industries in a state is therefore assumed to be the same as the share of direct and indirect activity (*excluding* these industries) occurring in that state.

Tallying individual industry estimates for each state produces state-level estimates of indirect defense expenditures. Though the distribution of defense purchases by an industry may not always correspond with that industry's general location, such divergences (whether for one industry or a few) will not greatly affect the state-level totals.

Table 7 summarizes the 2001 results of the state-share calculations for direct defense expenditures, indirect defense expenditures, total defense-related expenditures, nondefense output, and total output. The percentages to the right of the dollar amounts in each column show each state's share of the national total for the respective expenditure categories.

Table 7. Distribution of Defense and Nondefense Purchases by State, 2001
(In millions of 2001 dollars)

	Defense Direct	*%*	*Defense Indirect*	*%*	*Defense Total*	*%*	*Non-Defense*	*%*	*Total Output*	*%*
Alabama	6,852	2.4	3,903	1.8	10,755	2.1	248,816	1.5	259,573	1.5
Alaska	1,966	0.7	1,618	0.7	3,584	0.7	49,595	0.3	53,179	0.3
Arizona	5,983	2.1	3,285	1.5	9,268	1.8	228,536	1.4	237,807	1.4
Arkansas	1,216	0.4	1,532	0.7	2,748	0.5	145,723	0.9	148,474	0.9
California	40,325	14.0	25,035	11.3	65,359	12.8	1,827,487	11.2	1,892,826	11.2
Colorado	6,299	2.2	3,467	1.6	9,766	1.9	250,410	1.5	260,176	1.5
Connecticut	4,772	1.7	2,425	1.1	7,197	1.4	229,531	1.4	236,729	1.4
Delaware	1,175	0.4	588	0.3	1,763	0.3	60,129	0.4	61,892	0.4
District of Columbia	3,447	1.2	2,040	0.9	5,487	1.1	83,184	0.5	88,671	0.5
Florida	16,438	5.7	10,227	4.6	26,665	5.2	755,640	4.6	782,336	4.6
Georgia	11,333	3.9	6,749	3.1	18,082	3.5	482,883	3.0	500,962	3.0
Hawaii	4,659	1.6	1,976	0.9	6,635	1.3	138,406	0.8	145,041	0.9
Idaho	601	0.2	718	0.3	1,319	0.3	65,321	0.4	66,640	0.4
Illinois	5,022	1.7	7,690	3.5	12,711	2.5	768,890	4.7	781,608	4.6
Indiana	3,299	1.1	4,560	2.1	7,859	1.5	377,759	2.3	385,628	2.3
Iowa	1,032	0.4	1,459	0.7	2,490	0.5	170,697	1.0	173,186	1.0
Kansas	2,406	0.8	1,932	0.9	4,339	0.9	161,115	1.0	165,455	1.0
Kentucky	3,880	1.3	3,467	1.6	7,347	1.4	240,307	1.5	247,658	1.5
Louisiana	3,666	1.3	2,832	1.3	6,498	1.3	255,324	1.6	261,814	1.6
Maine	2,025	0.7	720	0.3	2,745	0.5	71,113	0.4	73,826	0.4
Maryland	12,091	4.2	5,890	2.7	17,981	3.5	350,740	2.1	368,714	2.2
Massachusetts	8,414	2.9	4,733	2.1	13,147	2.6	381,574	2.3	394,719	2.3
Michigan	2,498	0.9	5,134	2.3	7,632	1.5	617,734	3.8	625,372	3.7
Minnesota	2,186	0.8	3,062	1.4	5,248	1.0	302,041	1.8	307,296	1.8
Mississippi	3,896	1.3	1,942	0.9	5,838	1.1	142,011	0.9	147,809	0.9
Missouri	8,698	3.0	4,076	1.8	12,773	2.5	364,092	2.2	376,867	2.2
Montana	440	0.2	482	0.2	922	0.2	40,802	0.2	41,724	0.2
Nebraska	1,260	0.4	1,302	0.6	2,562	0.5	107,404	0.7	109,967	0.7
Nevada	1,188	0.4	1,797	0.8	2,985	0.6	128,546	0.8	131,531	0.8
New Hampshire	990	0.3	791	0.4	1,781	0.3	63,400	0.4	65,179	0.4
New Jersey	6,316	2.2	6,364	2.9	12,681	2.5	522,676	3.2	535,359	3.2
New Mexico	2,394	0.8	1,567	0.7	3,961	0.8	89,819	0.5	93,780	0.6
New York	7,354	2.5	12,264	5.6	19,618	3.9	1,019,885	6.2	1,039,506	6.2
North Carolina	7,869	2.7	5,703	2.6	13,572	2.7	476,876	2.9	490,458	2.9
North Dakota	629	0.2	529	0.2	1,158	0.2	36,980	0.2	38,138	0.2
Ohio	6,707	2.3	8,853	4.0	15,560	3.1	732,068	4.5	747,631	4.4
Oklahoma	4,122	1.4	2,795	1.3	6,917	1.4	190,200	1.2	197,119	1.2
Oregon	1,152	0.4	2,178	1.0	3,330	0.7	192,388	1.2	195,725	1.2
Pennsylvania	7,260	2.5	13,373	6.1	20,633	4.0	709,286	4.3	729,921	4.3
Rhode Island	1,016	0.4	671	0.3	1,687	0.3	57,380	0.4	59,068	0.4
South Carolina	4,196	1.5	3,501	1.6	7,697	1.5	216,086	1.3	223,787	1.3
South Dakota	385	0.1	461	0.2	846	0.2	41,060	0.3	41,906	0.2
Tennessee	3,982	1.4	3,505	1.6	7,486	1.5	342,966	2.1	350,467	2.1
Texas	22,987	8.0	16,205	7.3	39,192	7.7	1,117,825	6.8	1,157,020	6.9
Utah	1,941	0.7	1,741	0.8	3,682	0.7	126,002	0.8	129,685	0.8
Vermont	322	0.1	401	0.2	723	0.1	32,259	0.2	32,983	0.2
Virginia	30,198	10.5	13,507	6.1	43,705	8.6	529,508	3.2	573,175	3.4
Washington	9,220	3.2	5,638	2.6	14,858	2.9	362,887	2.2	377,756	2.2
West Virginia	488	0.2	1,025	0.5	1,514	0.3	91,488	0.6	93,002	0.6
Wisconsin	1,853	0.6	4,406	2.0	6,259	1.2	339,407	2.1	345,671	2.0
Wyoming	484	0.2	465	0.2	949	0.2	30,082	0.2	31,031	0.2
Total U.S.	**288,933**		**220,579**		**509,512**		**16,366,334**		**16,875,846**	

4. UNCERTAINTIES IN THE ESTIMATES

The *RDEPPS* estimates of direct defense expenditures rest upon data showing the historical distribution of purchases from given industrial sectors. The indirect defense expenditure estimates, by contrast, rest on an assumption that a state's share of indirect defense purchases from an industrial sector is the same as its share of total production in that sector, if the sector is national in scope. Although this assumption appears to be reasonable, it is clear that the degree of uncertainty is larger for the indirect state-level estimates than it is for the estimates of direct defense expenditures.

Both the direct and indirect expenditure estimates reflect projected changes in the composition of the DoD budget over the forecast period. Increases in planned purchases of ships or aircraft, for example, will lead to higher estimated expenditures in states that build ships and aircraft or that supply goods used in their production. The *RDEPPS* estimates assume that each state's shares of the various components of defense activity will remain what they have been in recent years. The estimates therefore do not account for possible changes in the geographic pattern of purchases caused by competition among firms located in different states.